Remarks/Arguments:

Claims 1-8, 12, 17 and 18 have been cancelled. Claim 19 is newly amended. Claim 9 now depends on claim 19. Claims 20 and 21 have not been amended.

Applicants' disclosure is directed to a voltage controlled oscillator (VCO) that consists of a plurality of variable capacitor circuits. Different resistor values are utilized to improve the linearity characteristics of the resonant frequency of the VCO.

On page 2 of the Office Action claim 19 is rejected under 35 U.S.C. as being anticipated by Oehm et al., ESSCIRC 2002 "Linear Controlled Temperature Independent Varactor Circuitry".

Oehm teaches a VCO that consists of a plurality of variable capacitor circuits. Furthermore, different reference voltages generated by resistors of the same value are applied to improve the linearity characteristics of the capacity of the variable capacitor circuits.

Applicants invention, as recited by claim 19, includes a feature which is neither disclosed nor suggested by the art of record, namely:

> **...m pieces of resistance connected in series between a power supply...**
>
> **...the resistance values of said first resistance and said second resistance are different than each other...**
>
> **...linearity of a resonant frequency characteristic of the voltage-controlled oscillator is improved...**

Claim 19 relates to utilizing **resistors of different values** in order to create reference voltages that have different potentials with respect to one another. By creating different potentials with respect to one another the linearity of the resonant frequency of the VCO is improved. This feature is found in the originally filed application at page 27 lines 9-11.

It is known that different reference voltages applied to the capacitor circuits will yield an overall linear change of capacitance in response to a varying control voltage. This linear response is represented by the dashed line of prior art figure 15 and furthermore disclosed in figure 3 of Oehm. Thus, one objective of the disclosure is to provide a linear change in capacitance with respect to control voltage.

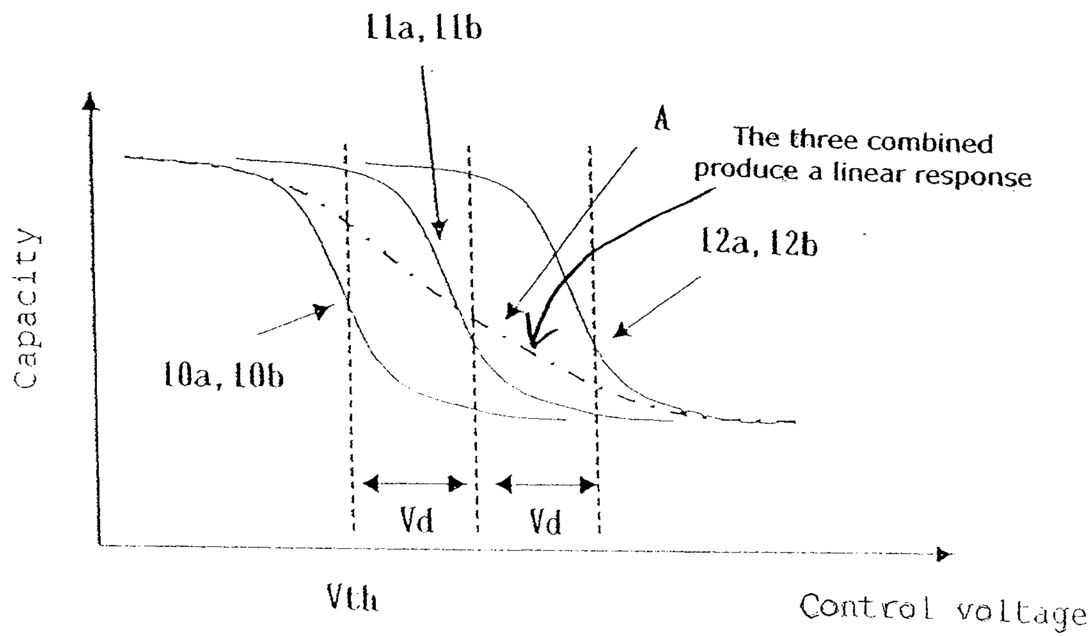

Fig. 15 PRIOR ART

Another objective of the disclosure is to improve the linearity characteristics of the resonant frequency of the VCO. In general, the resonant frequency of a VCO

is determined by an inductance and capacitance of a resonant circuit. Exhibit 1 shows the general structure of the resonant circuit and formulas 1-4 describe the relationship between the resonant frequency and the circuit components.

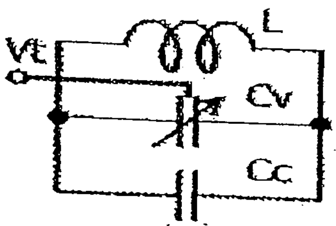

Exhibit 1

$$f = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{L(Cc+Cv)}} \quad \text{Eq 1}$$

$$f^2 = \frac{1}{4\pi^2 LC} = \frac{1}{4\pi^2\{L(Cc+Cv)\}} \quad \text{Eq 2}$$

$$C = \frac{1}{4\pi^2 Lf^2} \quad \text{Eq 3}$$

$$Cc + Cv = \frac{1}{4\pi^2 Lf^2} \quad \text{Eq 4}$$

According to formula 4, Cv must be in reverse proportion to the square of the resonant frequency f in order to vary the resonant frequency of the VCO linearly. Furthermore, the differences between the reference voltages must be different. For example, exhibit 2 shows a VCO wherein the difference between Vref1 and Vref2 is .9 volts and the difference between Vref2 and Vref3 is .4 volts. These different voltages are obtained by using different value resistors.

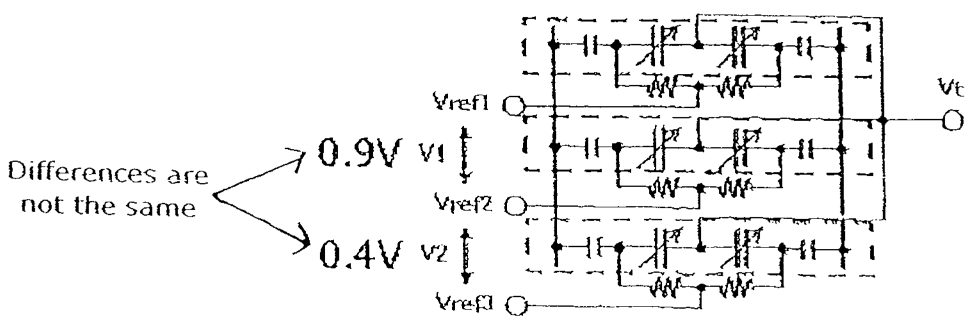

Exhibit 2

The result of using different resistor values is shown in exhibit 3. Exhibit 3 shows the change in capacitance (C=Cv+Cc) of the VCO versus the inputted control voltage. Each of the three variable capacitor circuits exhibit different characteristics in response to the same inputted control voltage. Therefore it is possible to improve the linearity of the frequency characteristics of the VCO.

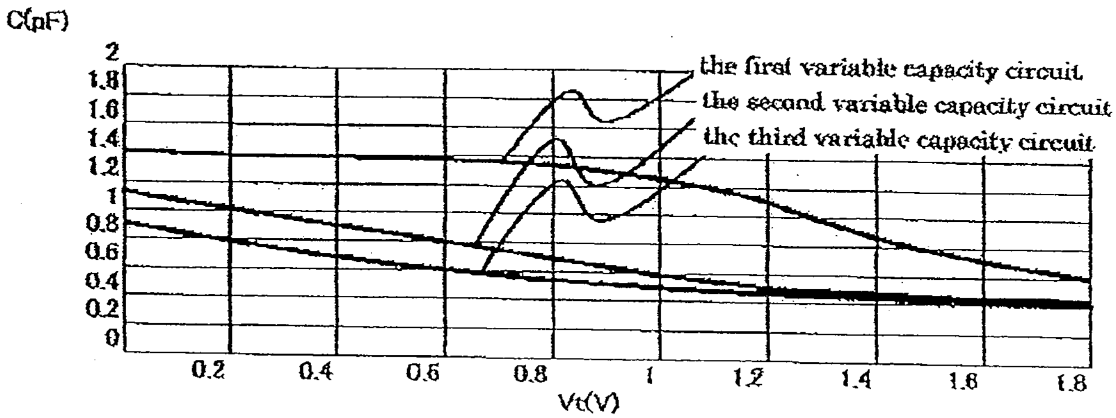

Exhibit 3

In contrast, Oehm discloses these different reference voltages being generated by utilizing **resistors of equal value** to evenly divide down the supply voltage. By using resistors of equal value it is possible to obtain reference voltages that have different values with respect to ground, thus improving the linearity of the capacitance as shown in figure 5. The differences of the reference voltages with respect to one another, however, **are the same** (160mV). Thus, it is possible for Oehm to improve the linearity of the capacitance circuit, but not possible to improve the linearity of the resonant frequency of the VCO.

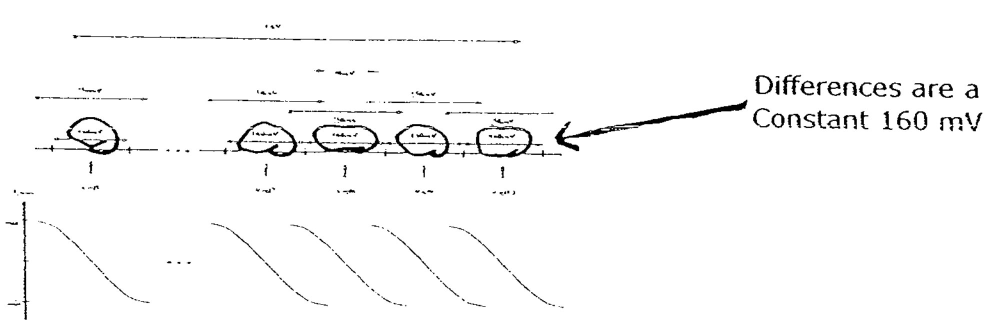

Fig. 5 (Oehm)

It is because Applicants' include the feature of "the resistance values of said first resistance and said second resistance are different than each other", that the following advantages are achieved. An advantage is the ability to produce reference voltages that have different potentials with respect to one another, and therefore improve the linearity characteristics of the resonant frequency of the VCO.

Accordingly, for the reasons set forth above, claim 19 is patentable over the art of record. Claims 9, 10, 11, 20 and 21 include all the features of claim 19 from which they depend. Thus, claims 9, 10, 11, 20 and 21 are patentable over the art of record for the reasons set forth above.

Respectfully submitted,

Lawrence E. Ashery, Reg. No. 34,515
Attorney for Applicants

LEA/RE/fp/dmw

Dated: August 10, 2007

P.O. Box 980
Valley Forge, PA 19482
(610) 407-0700
150335